PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
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PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing *(day/month/year)*	06 DEC 2006
Applicant's or agent's file reference 31253	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/IL06/00075	18 January 2006 (18.01.2006)	15 February 2005 (15.02.2005)

International Patent Classification (IPC) or both national classification and IPC

IPC: **A61B 5/02**(2006.01)
USPC: 600/504,506

Applicant

NEW LEAF CAPITAL LTD.

1. This opinion contains indications relating to the following items:

☒	Box No. I	Basis of the opinion
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☒	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis(b)* that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/ US	Date of completion of this opinion	Authorized officer
Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (571) 273-3201	12 October 2006 (12.10.2006)	Charles Marmor, II Telephone No. (571) 272-3000

Form PCT/ISA/237 (cover sheet) (April 2005)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/IL06/00075

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:

☒ the international application in the language in which it was filed

☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

a. type of material

☐ a sequence listing

☐ table(s) related to the sequence listing

b. format of material

☐ on paper

☐ in electronic form

c. time of filing/furnishing

☐ contained in the international application as filed.

☐ filed together with the international application in electronic form.

☐ furnished subsequently to this Authority for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/IL06/00075

Box No. V Reasoned statement under Rule 43 *bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims 2,3,5,6,8-10,16-23,28-31,33-36,39,40,42-89	YES
	Claims 1,4,7,11-15,24-27,32,37,38,41	NO
Inventive step (IS)	Claims 2,3,5,6,8-10,16-23,28-31,33-36,39,40,42-89	YES
	Claims 1,4,7,11-15,24-27,32,37,38,41	NO
Industrial applicability (IA)	Claims 1-89	YES
	Claims NONE	NO

2. Citations and explanations:

Please See Continuation Sheet

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/IL06/00075

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

Claims 28 and 29 are objected to under PCT Rule 66.2(a)(iii) as containing the following defect(s) in the form or contents thereof:

On line 2 of claim 28. "to so as to" should be replaced with "so as to".

On line 3 of claim 29, "to wind" should be replaced with "to wind about".

Supplemental Box
In case **the space in any of the preceding boxes is not sufficient.**

V. 2. Citations and Explanations:
Claims 1, 4, and 41 lack novelty under PCT Article 33(2) as being anticipated by US Patent No. 4,803,431 to Sano et al. Sano teaches a method of calculating blood flow (a three-dimensional velocity of the blood flow) in an organ (vein) of a subject using output radiofrequency signals transmitted to the organ and input radiofrequency signals received from the organ. A phase shift is determined of the input signals relative to the output signals and the phase shift is used to calculated the blood flow (col. 4, lines 13-44; col. 5, lines 6-37 of Sano).

Regarding claim 4, Sano also teaches a signal processing unit and calculator 206 for executing the method described above (col. 4 ,lines 40-43 of Sano).

Claims 7, 11-15, 24-27, 32, 37, and 38 lack novelty under PCT Article 33(2) as being anticipated by US Patent No. 5,642,734 to Ruben et al. Ruben teaches a system comprising a radiofrequency generator 34 for generating output radiofrequency signals (col. 5, lines 20-30 of Ruben). A plurality of electrodes 48A, B 50A, B are designed to be connectable to the skin of the subject and transmit output radiofrequency signals to the organ and sense input radiofrequency signals of the organ (figs. 5A & B; col. 5, lines 45-64 of Ruben). A signal processing unit 34, 42, 94 determines a phase shift of the input signals relative to the output signals (col. 9, lines 34-41 of Ruben), the phase shift being indicative of the blood flow in the organ, wherein such a relationship between the phase shift and blood flow is an inherent property of the phase shift and blood flow.

Regarding claim 11, a mixer electrically communicates with the generator and some of the electrodes and mixes the output signals and input signals to provide a mixed radiofrequency signal indicative of the blood flow and electronic circuitry for filtering out a portion of the mixed signal (col. 7, lines 3-17; col. 7, line 51-col. 8, line 37 of Ruben).

Regarding claim 12, the mixer is operable to provide a radiofrequency sum and a radiofrequency difference (col. 7, lines 51-62; col. 8, lines 20-31 of Ruben).

Regarding claim 13, the circuitry comprises a low pass filter 128 for filtering out the sum (col. 8, lines 32-37 of Ruben).

Regarding claim 14, the circuitry comprises an analog amplification circuit (col. 6, lines 10-39 of Ruben), wherein the circuit is certainly capable of amplifying any signal. Applicants should note that "for amplifying . . ." is merely "intended use" language.

Regarding claim 15, the circuitry comprises a digitizer 120, wherein the digitizer is capable of digitizing any radiofrequency signal (ol. 7, lines 22-23 of Ruben). Applicants should note that "for digitizing . . ." is merely "intended use" language.

Regarding claim 24, the language in this claim appears to merely describe a method step describing a step of selecting the number of electrodes, wherein such a method limitation fails to further limit the apparatus of claim 11. At best, the language may be considered "product by process" language wherein the claim is evaluated based on the result of such a step rather than the accomplishment of the step itself. In such a case, the end result of such a step and the invention of Ruben are the same.

Supplemental Box
In case **the space in any of the preceding boxes is not sufficient.**

Regarding claims 25-27, the plurality of electrodes comprises two, three , or four electrodes (figs. 5A, B of Ruben).

Regarding claim 32, a detector electrically communicates with at least a portion of the electrodes for detecting a voltage between a first and second location of the subject and for generating the input signals in response to the voltage, wherein the input signals are indicative of impedance (col. 5, line 45-col. 6, line 47 of Ruben).

Regarding claims 37 and 38, the system comprises a display device, wherein a personal computer generally refers to the system built around a microprocessor for personal use, including the input/output devices and peripherals that a general user would require, wherein such device include a display. With further regard to claim 38, a general display for a personal computer is certainly capable of displaying the blood flow as a function of time.

Claims 2, 3, 5, 6, 42,and 43 meet the criteria set out in PCT Article 33(2)-(3), because the prior art does not teach or fairly suggest a method or apparatus wherein calculating the blood flow comprises using a linear relationship between the phase shift and blood flow, in combination with all of the other limitations of the claims.

Claims 8-10 and 76-89 meet the criteria set out in PCT Article 33(2)-(3), because the prior art does not teach or fairly suggest a system wherein the signal processing unit comprises an envelope elimination unit designed and configured to reduce or eliminate amplitude modulation of the input radiofrequency signals so as to provide input radiofrequency signals of substantially constant envelope, in combination with all of the other limitations of the claims.

Claims 16 and 17 meet the criteria set out in PCT Article 33(2)-(3), because the prior art does not teach or fairly suggest a system wherein the circuitry is designed so as to minimize the sensitivity of the input radiofrequency signals to impedance differences between the plurality of electrodes and the organ of the subject, in combination with all of the other limitations of the claims.

Claims 18-23 meet the criteria set out in PCT Article 33(2)-(3), because the prior art does not teach or fairly suggest a system wherein a data processor calculates at least one quantity using the remaining portion o the mixed radiofrequency signal , said at least one quantity being selected form the group consisting of a stroke volume, cardiac output, brain intraluminal blood flow, and artery blood flow rate, in combination with all of the other limitations of the claims.

Claims 28-31 meet the criteria set out in PCT Article 33(2)-(3), because the prior art does not teach or fairly suggest a system wherein at least a portion of the electrodes a designed and constructed so as to have a substantial constant sensitivity to electrical signals transmitted through the electrodes, irrespective of an orientation of the electrodes on the subject, or the electrodes comprises at least one elongated conducting material designed and constructed to wind about at least a portion of an external organ of the subject, so as to have a substantial constant sensitivity to electrical signals transmitted through said electrodes, irrespective of an orientation of the electrodes on the organ, in combination with all of the other limitations of the claims.

Claims 33-36 the criteria set out in PCT Article 33(2)-(3), because the prior art does not teach or fairly suggest a system further comprising at least one sensor for sensing the voltage, said at least one sensor being designed and constructed for generating signals having a magnitude which is a function of blood flow in, from, or around the organ, or wherein the electronic circuitry comprises a differentiator for performing at least one time-differentiation, to provide a respective derivative of the impedance and/or hemodynamic reactance of the organ, in combination with all of the other limitations of the claims.

Claims 39 and 40 meet the criteria set out in PCT Article 33(2)-(3), because the prior art does not teach or fairly suggest a system wherein the signal to noise ratio increased by at least 10 dB or at least 20 dB, in combination with all of the other limitations of the claims. .

Claims 44-46 meet the criteria set out in PCT Article 33(2)-(3), because the prior art does not teach or fairly suggest a method further comprising reducing or eliminating amplitude modulation of the input radiofrequency signals so as to provide input radiofrequency signal of substantially constant envelope, in combination with all of the other limitations of the claims

Claims 47-75 meet the criteria set out in PCT Article 33(2)-(3), because the prior art does not teach or fairly suggest a method further comprising mixing the output radiofrequency signals and said input radiofrequency signals so as to provide a mixed radiofrequency signal being indicative of the blood flow, and filtering out a portion of the mixed radiofrequency signal so as to substantially increase a signal to noise ratio of a remaining portion of the mixed radiofrequency signal, in combination with all of the other limitations of the claims.

Claims 1-89 meet the criteria set out in PCT Article 33(4), and thus meet industrial applicability because the subject matter claimed can be made or used in industry.